Eta Model Implementation at Climate Prediction Center

NCEP Eta model for the African domain has been implemented in February 2003 with forecasts for southern Africa. Since then the model runs have been extended to run for the domains of east africa and west africa. An optimal model window has been selected based on the user requirements, model related constraints and the constraints on the computational resources and real-clock runtime for a 72hr forecast. Another consideration was the domain should be sufficiently large to allow the eta model to capture smaller scale details that can not be done with a coarser global model and yet the domain should be small enough not veer too much away from the general, large-scale features captured by the governing global model (influencing through initial and boundary conditions).

General Model Characteristics Implemented:

Model Window: For the African domains, a model window consisting of 170 (in longitude) x 240 (in latitude) grid points has been selected that spans approximately 30 degrees in latitude and 50 degrees in longitude. This window is moved to the region of forecast under consideration.

Resolution: For African domains a model resolution of 0.154 degrees (in longitude), 0.141 degrees (in latitude) translates to about 22 km. For the Afghan domain a model resolution of 0.099 degrees (in longitude), 0. degrees (in latitude) translates to about 12 km.

Integration time step: 60 seconds.

Levels: 38 Levels in the vertical direction.

Convection: BMJ (Bettes-Miller-Janjic) convection parameterization scheme.

Input Data : 00Z Cycle 1-degree resolution GFS forecast data at 3 hour intervals from 00 to 78 forecast hours and other parameters such as surface data (surface fluxes, soil, slope, vegetation and more), sst, terrain etc.

East Africa

Domain Limits: Latitude: 8S to 28S Longitude: 9E to 58E

Forecast run time: 7 hours approximately for a 72 hr forecast run..

Input Data : 00Z Cycle GFS forecast data at 3 hour intervals from 00 to 78 forecast hours and other parameters such as surface data, sst, terrain etc.

Model Output Data: For a detailed list of model output variables see appendix A.

Output Intervals: 6 hourly starting from 00 to 72 forecast hours.

Product Output: Pressure (mean sea-level pressure), Winds (200,700,850,1000hpa and 10m level), Temperature(200,700,850,1000hpa and 2m level)), Geopotential height(500hpa), Relative humidity (700,850,1000hpa), Precipitation(24 hour accumulated precipitation at 24, 48, 72 forecast hours and 3-day accumulated precipitation) .

Product Web Page: http://www.cpc.ncep.noaa.gov/products/african_desk/eta_fcst/index.html

West Africa

Domain Limits: Latitude: 5S to 22N Longitude: 24W to 21E

Forecast run time: 7 hours approximately for a 72 hr forecast run..

Input Data : 00Z Cycle GFS forecast data at 3 hour intervals from 00 to 78 forecast hours and other parameters such as surface data, sst, terrain etc.

Model Output Data: For a detailed list of model output variables see appendix A.

Output Intervals: 6 hourly starting from 00 to 72 forecast hours.

Product Output: Pressure (mean sea-level pressure), Winds (200,700,850,1000hpa and 10m level), Temperature(200,700,850,1000hpa and 2m level)), Geopotential height(500hpa), Relative humidity (700,850,1000hpa), Precipitation(24 hour accumulated precipitation at 24, 48, 72 forecast hours and 3-day accumulated precipitation) .

Product Web Page: http://www.cpc.ncep.noaa.gov/products/african_desk/eta_fcst/index.html

Southern Africa

Domain Limits: Latitude: 38S to 8S Longitude: 10E to 60E

Forecast run time: 7 hours approximately for a 72 hr forecast run..

Input Data : 00Z Cycle GFS forecast data at 3 hour intervals from 00 to 78 forecast hours and other parameters such as surface data, sst, terrain etc.

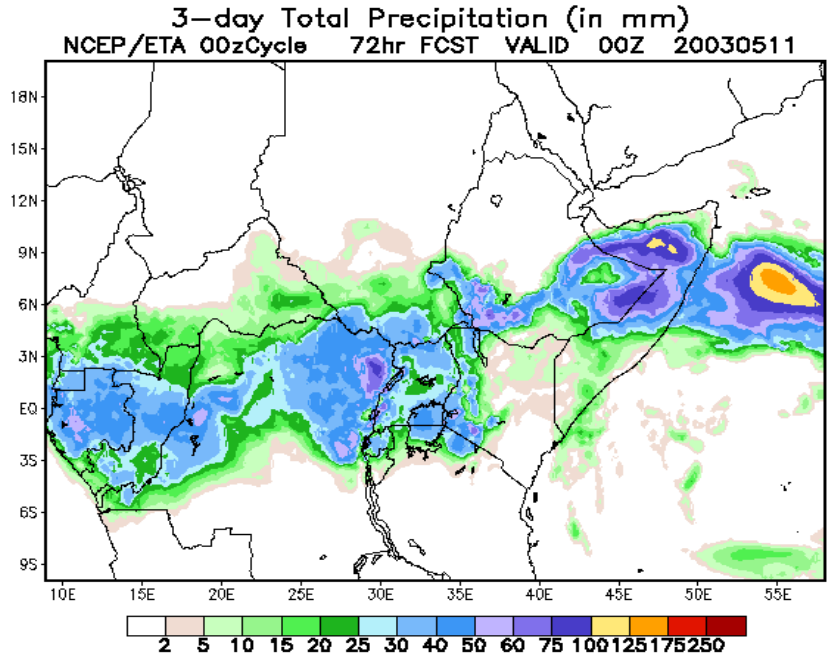
Model Output Data: For a detailed list of model output variables see appendix A.

Output Intervals: 6 hourly starting from 00 to 72 forecast hours.

Product Output: Pressure (mean sea-level pressure), Winds (200,700,850,1000hpa and 10m level), Temperature(200,700,850,1000hpa and 2m level)), Geopotential height(500hpa), Relative humidity (700,850,1000hpa), Precipitation(24 hour accumulated precipitation at 24, 48, 72 forecast hours and 3-day accumulated precipitation) .

Product Web Page: http://www.cpc.ncep.noaa.gov/products/african_desk/eta_fcst/index.html

Reading Legends and text in the output products:
Almost all the eta forecast graphics on the web have a time stamp. For example, a typical time stamp may read like "NCEP/ETA 00zCycle 72 hr FCST Valid 00Z 20030511". This means the forecast started with 00Z initial data 72 hours prior to the specified valid time and date of the forecast. Currently NCEP GFS runs four forecast cycles at 00z, 06z, 12z and 18z respectively. The following image illustrates 72 hour accumulated (forecast) precipitation that ended at 00Z 20030511. Other text information and color bars are self explanatory. This information is particularly useful for people with no background in operational model forecasting.



Appendix A

List of Model Output Parameters:

Mean Sea-Level Pressure
Dew Point Temperature
Temperature
Geopotential Heights
Relative Humidity
Zonal Component of Wind
Meridional Component of Wind
Vertical Velocity
Soil Wetness
Soil Temperature
Soil Type
Vegetation Type
Precipitable Water
Downward Short-wave Radiative Flux
Downward Long-wave Radiative Flux
Upward Short-wave Radiative Flux
Upward Long-wave Radiative Flux
Large-Scale Precipitation
Convective Precipitation
Total Precipitation
Potential Temperature
Categorical Snow (Yes or No)
Accumulated Snow